

Analysis of land degradation severity in sub-Saharan Africa and the potential impacts of management options at different scales

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Introduction

Land degradation is a very serious threat to the environment and livelihoods in Africa

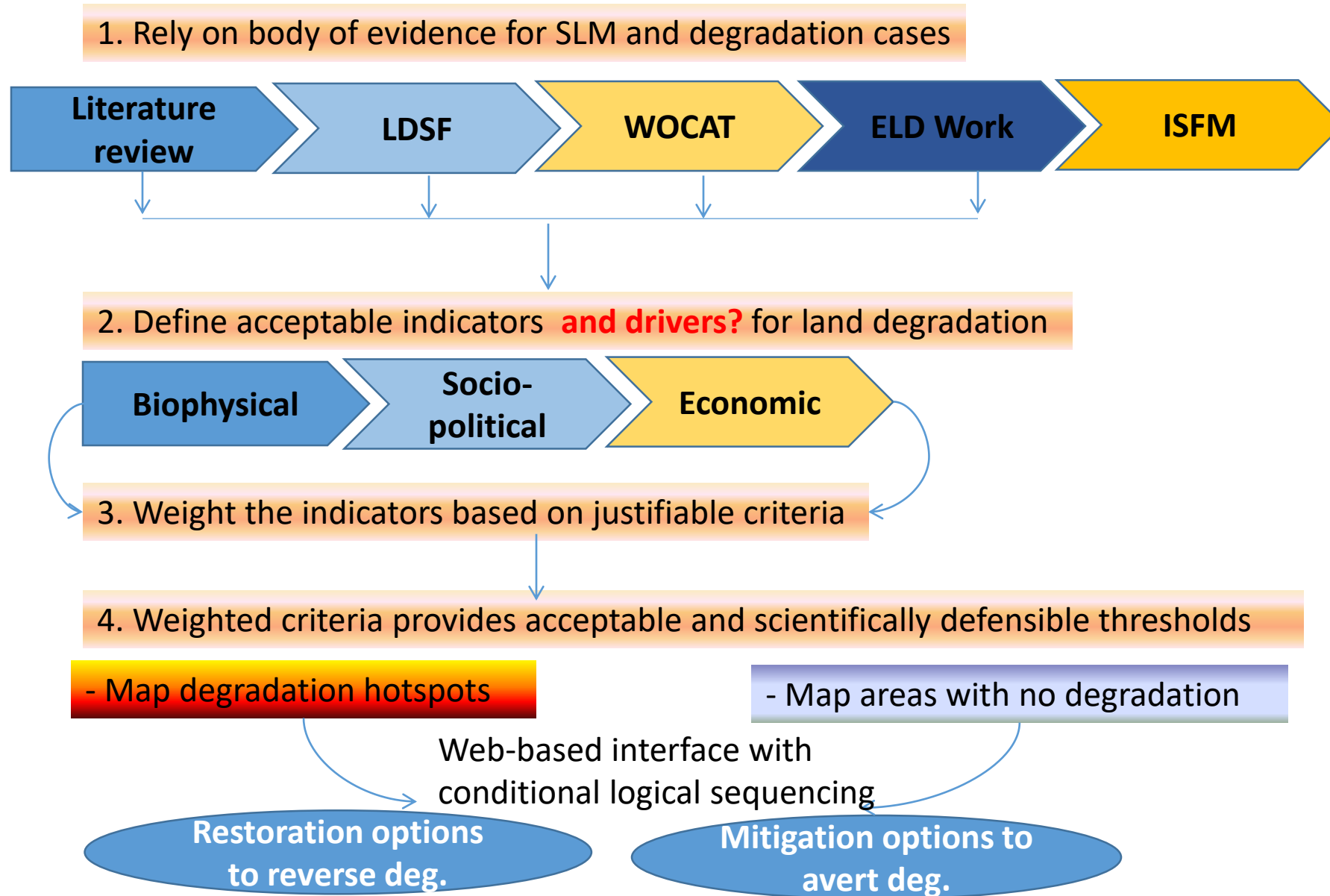
Consistent information on the severity and spatial patterns of affected areas is lacking

In addition, all areas are not affected equally

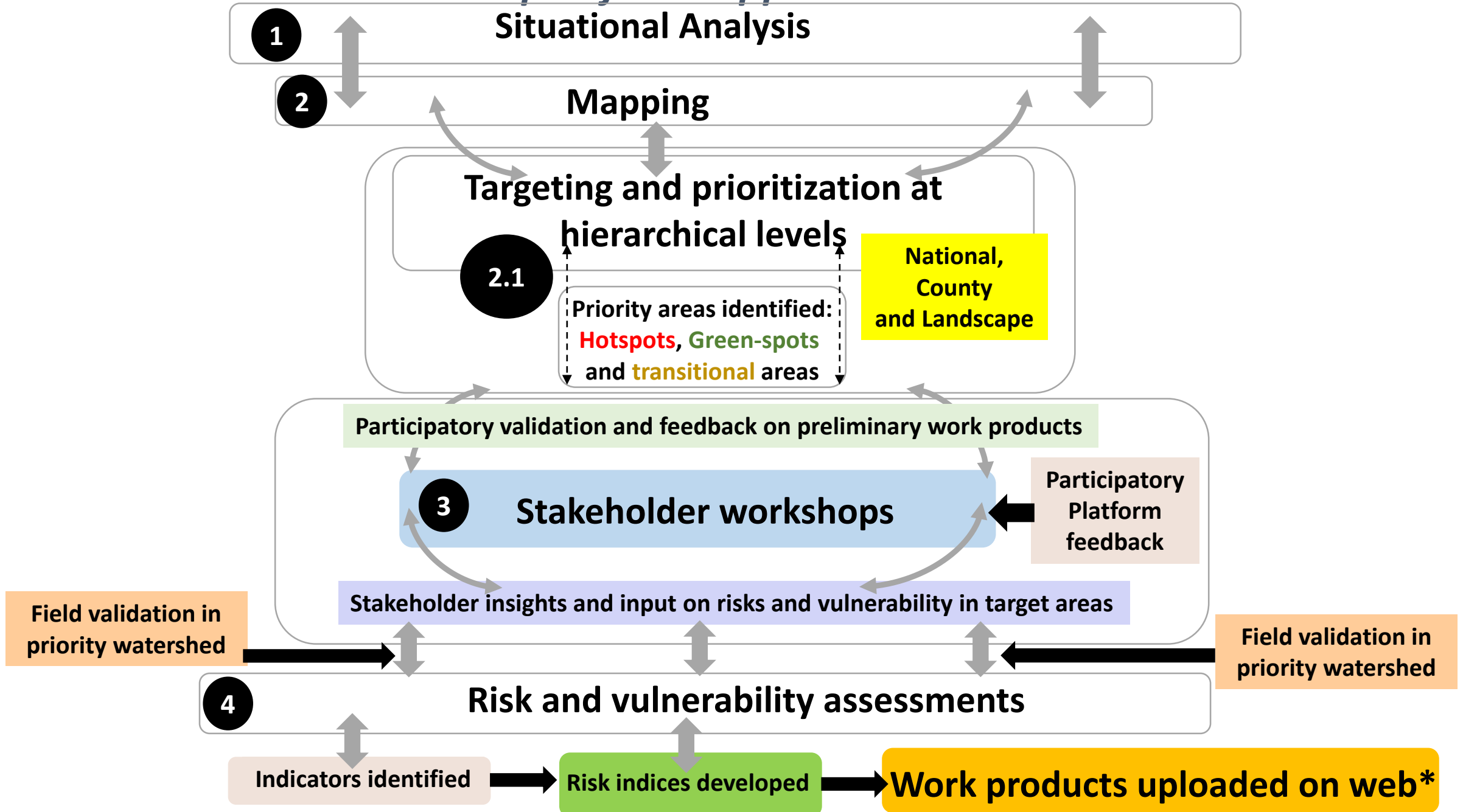
These pose difficulty on planning management interventions

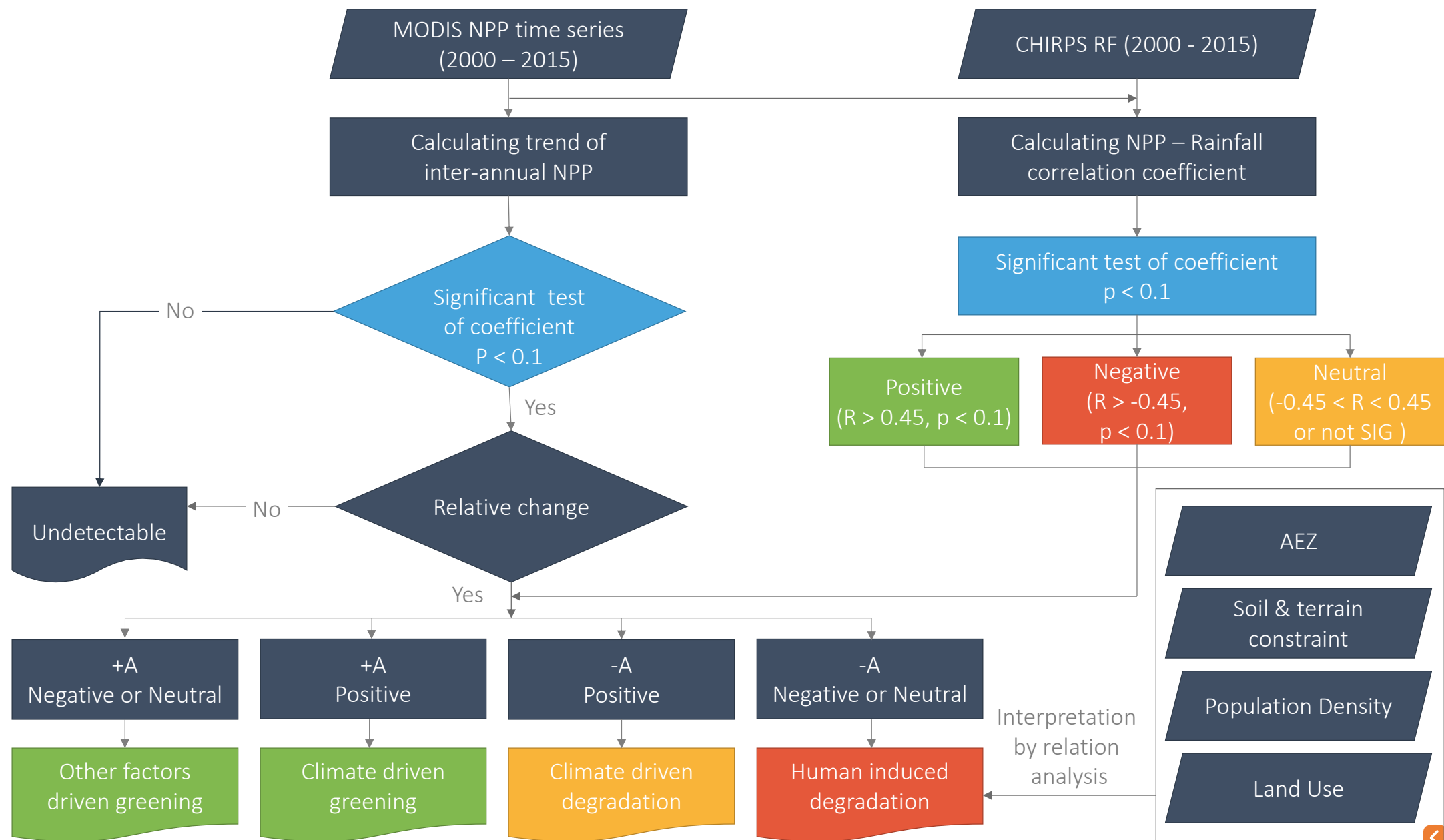
Identification of major problem areas is necessary to design appropriate management interventions

Proposed framework methodology



Scope of LDA Approach





Where in SSA are the priority areas of concern?

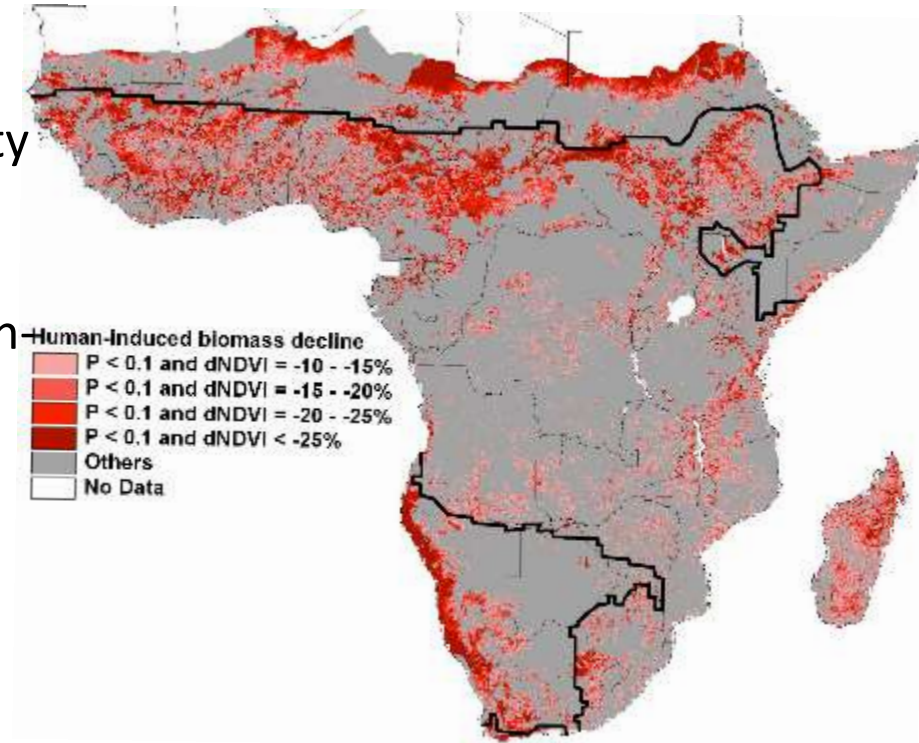
Spatial pattern of land degradation hotspots delineated using long-term satellite and climate data

10 % of SSA lost its productive capacity
(42% within sub-humid zone)

~ 60 million people affected by human-induced degradation

44% wood/shrub land; 13% cropland;
12% grassland

~30% degraded not suitable for
agriculture



Assess potentials and constraints of the hotspots

Which management options can possibly help tackle degradation?

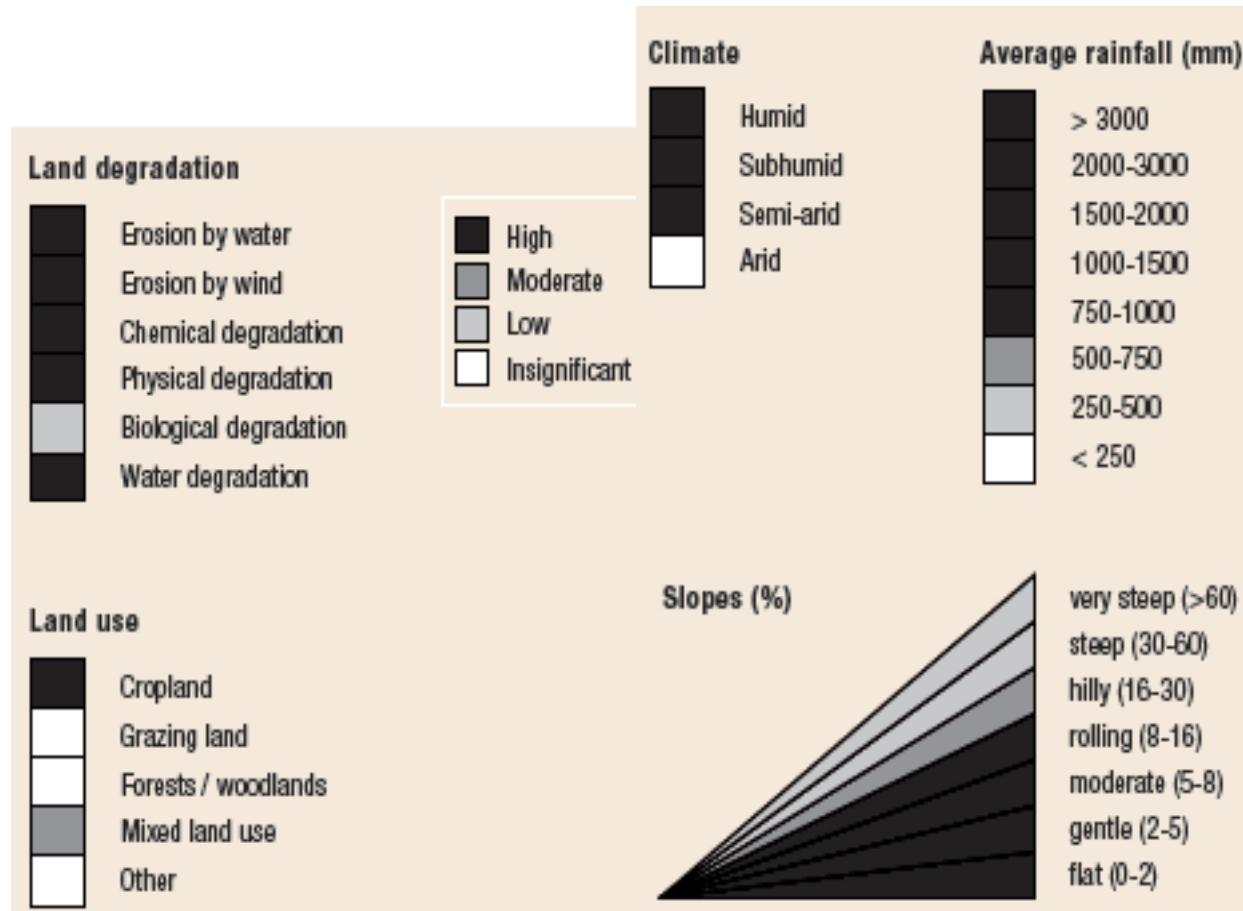
Various options available in literature (e.g., WOCAT, 2007, 2011; DESIRE, 2012)

Some mentioned to be appropriate for SSA:



“Biofuel” plants - Jatropha

What are the basic requirements of each management option?



Basic biophysical requirements for CA (Liniger et al., 2011)

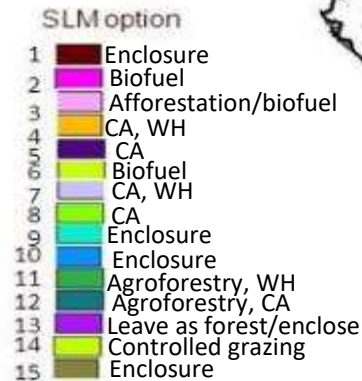
Match problem to the solution

Spatial pattern of management options targeting hotspots

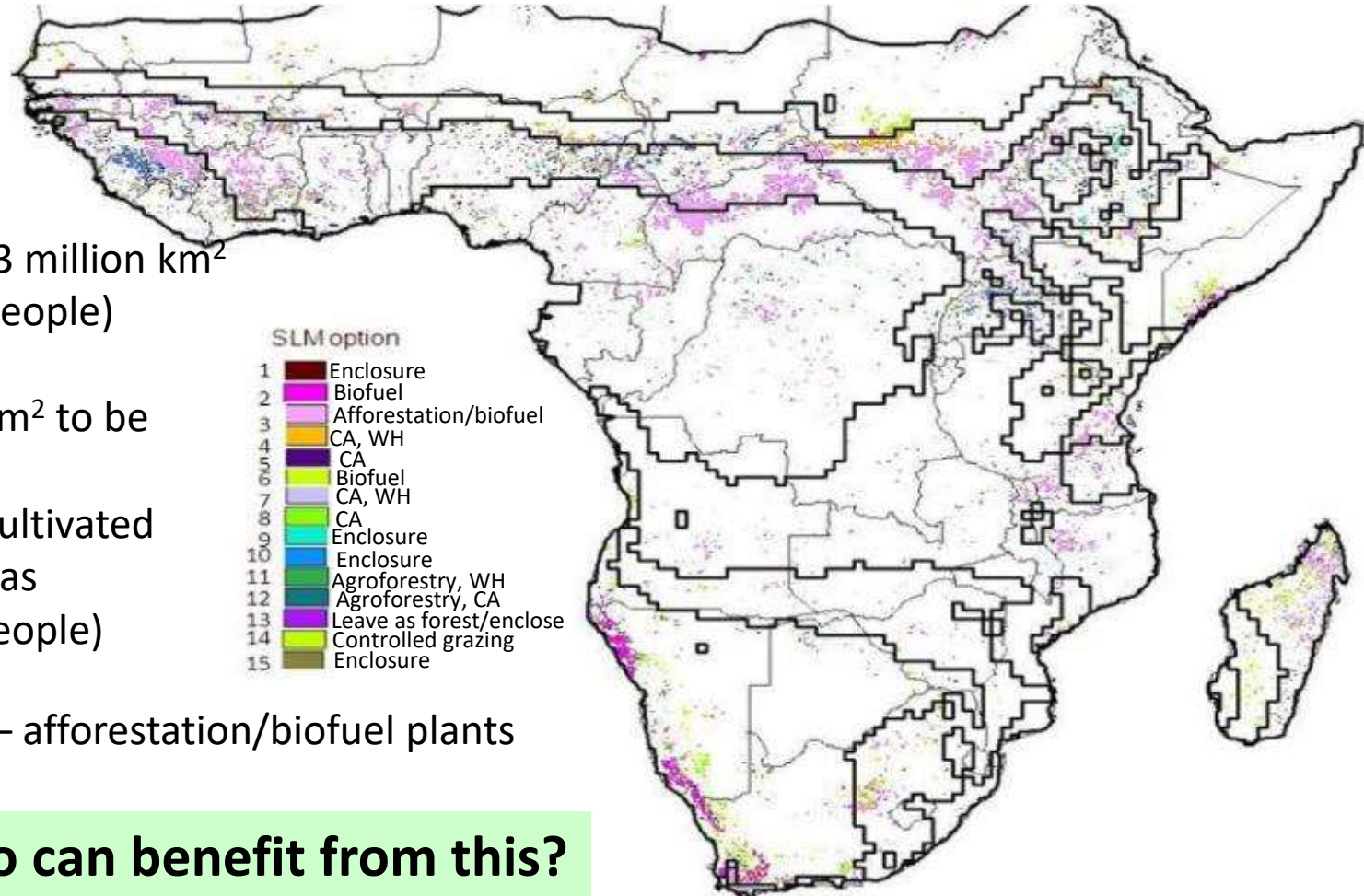
CA targets 0.3 million km²
(~ 14 million people)

0.29 million km² to be
'enclosed',
46% occupy cultivated
or grazing areas
(8.6 million people)

120,000 km² – afforestation/biofuel plants



Who can benefit from this?

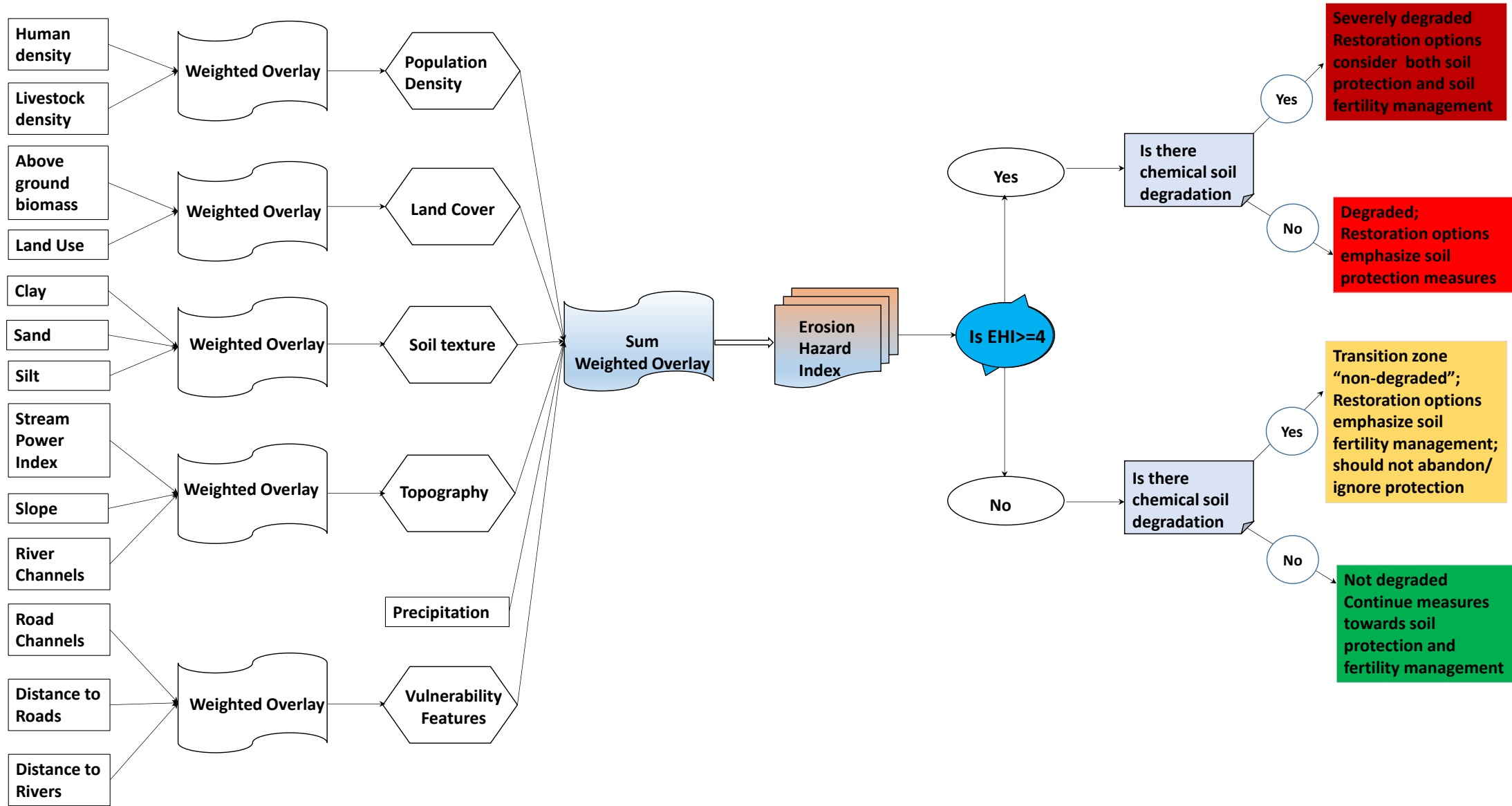


Interventions at national/district – local offices, NGO, etc.

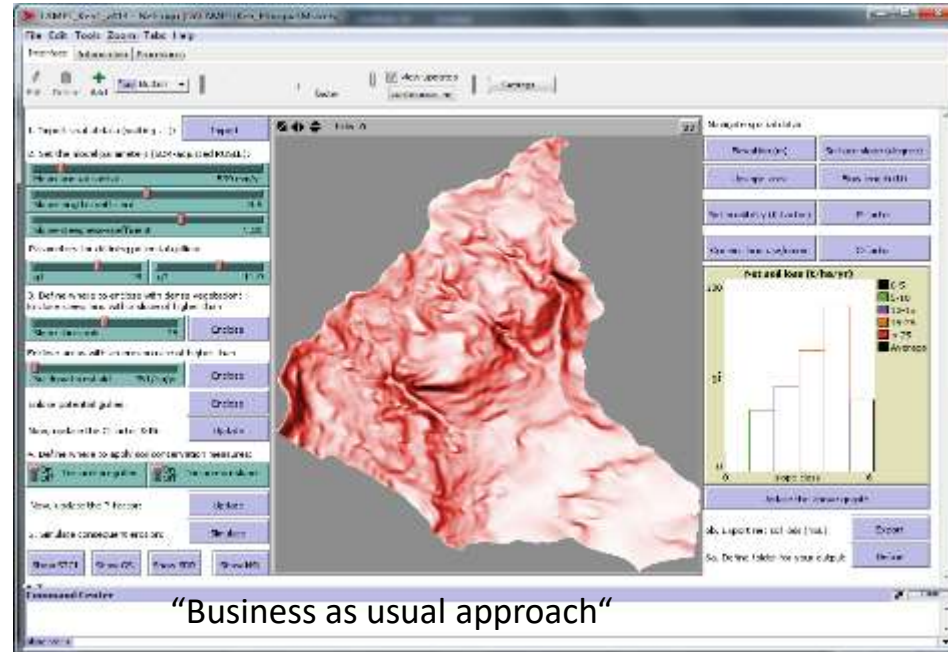
But the role on tackling specific degradation process or restoring degraded areas or improving productivity will be minimum because of lack of detailed process understanding.

**More elaborated study and detailed analysis needed.
More detailed data should be used.**

County Analysis Conceptual Framework

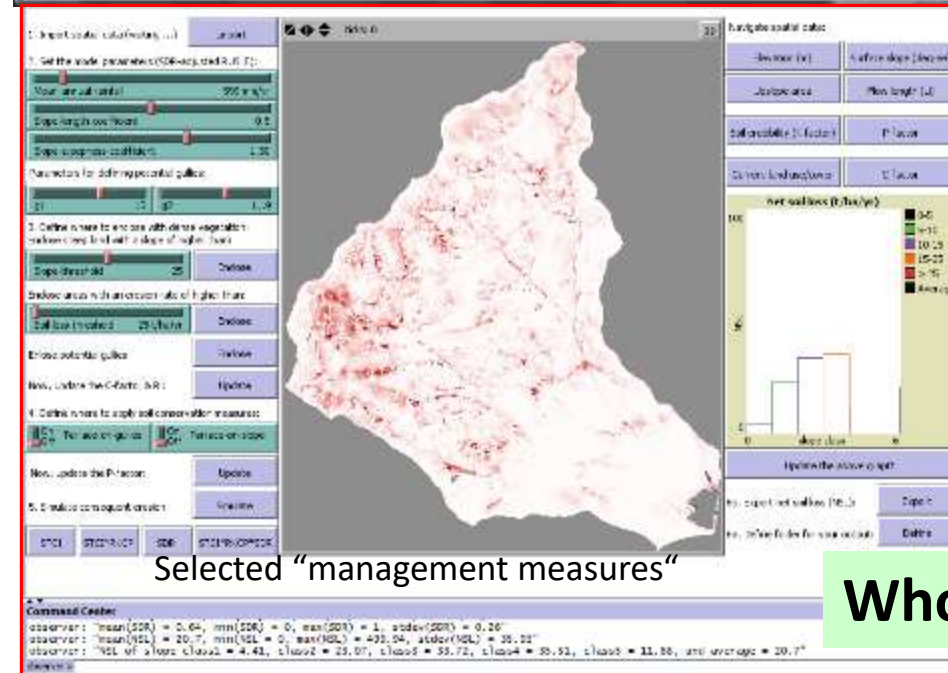


Example application of planning and management tool at landscape level



“Business as usual approach”

High soil erosion, 35% of areas above threshold



Selected “management measures”

Targeting steep slopes and gullies reduces sediment yield by > 40%

Targeting areas of soil loss > 25 t ha⁻¹ y⁻¹ and gullies reduces sediment yield by >65%

Who can benefit from this?

Landscape scale

**Results and studies at catchment
scale are essential to guide
landscape and regional planning.
Regional, national, NGO, etc**

But the role on tackling specific degradation process or restoring degraded areas or improving productivity will be minimum because of lack of detailed process understanding.

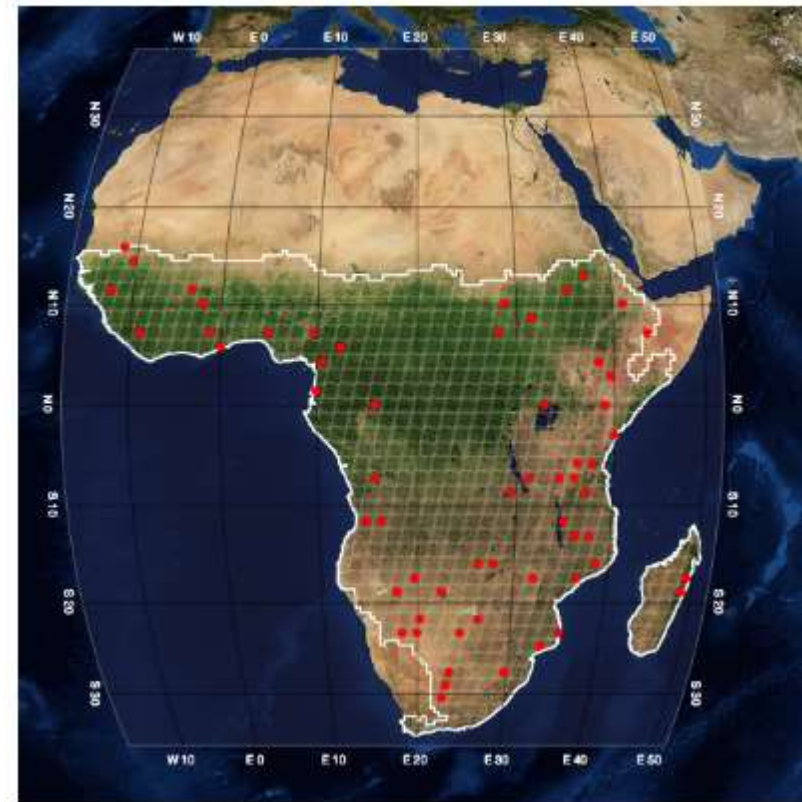
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Detailed process understanding at farm/plot level

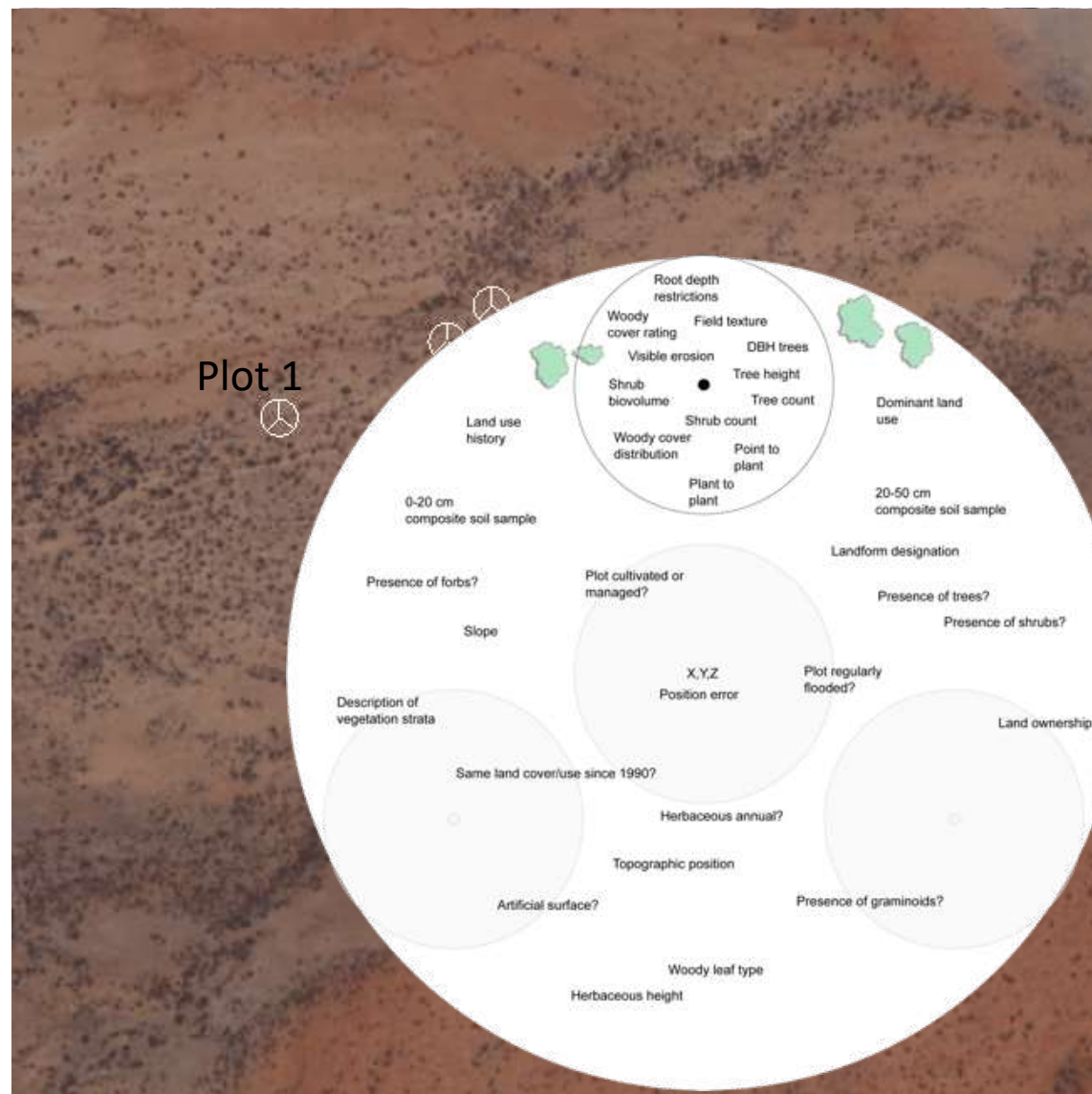
Land degradation surveillance framework (LDSF) employed to collect data on a variety of environmental variables and processes

Data over 50-sentinel sites collected using spatially stratified random sampling approach

Hierarchical sampling framework:
Site (100 km²) – Cluster (1 km²) –
Plot (0.1 ha) – Subplot (0.01 ha)



Hierarchical sampling framework



Site = 100 km²

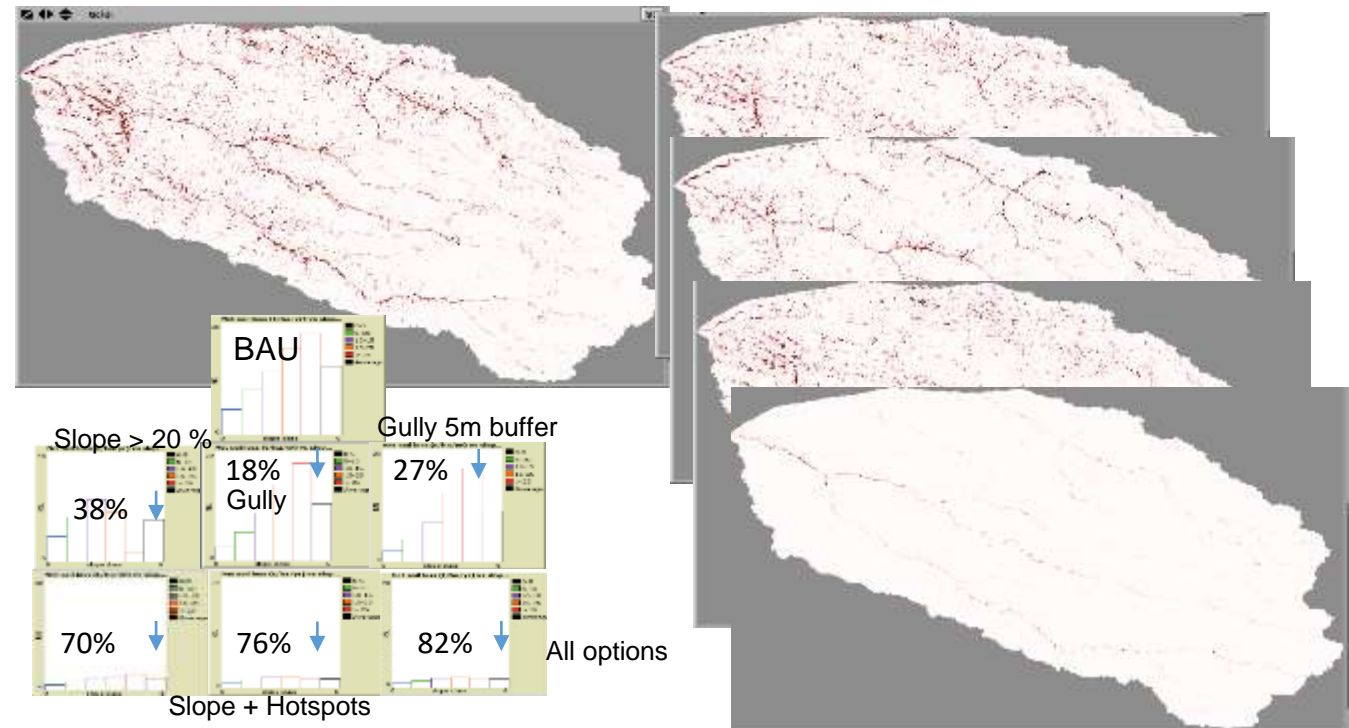
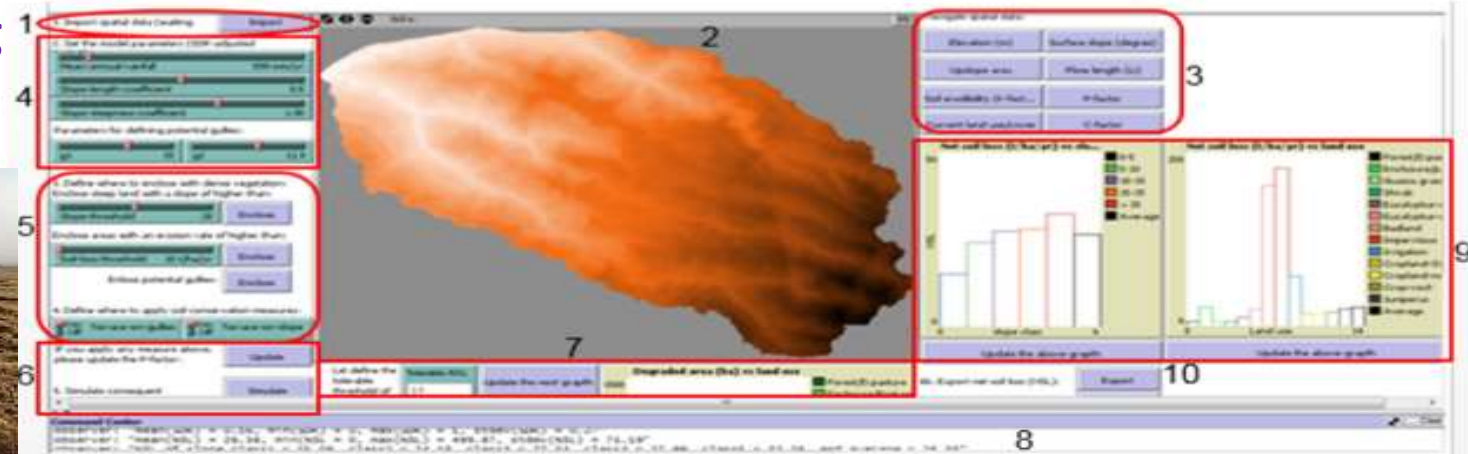
Cluster = 1 km²

Plot = 0.1 ha

Sub-plot = 0.01 ha

Evidence generation (at different scales using variety of approaches)

Plot and landscape level assessments and monitoring to assess watershed performance





Conclusion

Developing countries should increase yield by 100% in 2050

Land degradation will continue to be challenge

Prevention, restoration and sustainable use needed

Multi-scale approach necessary as needs, users, processes vary across scale

Develop decision support tool for detailed analysis of the actual and potential impact of management options, including cost-benefit analysis

Thanks!